

**PROJECT APPLICATION TO THE
STATE WATER RESOURCES CONTROL BOARD
SAFE, CLEAN, RELIABLE WATER SUPPLY ACT (PROPOSITION 204)
DELTA TRIBUTARY WATERSHED PROGRAM (DELTA PROGRAM)**

COVER PAGE

APPLICANT: Contra Costa Water District

ADDRESS: 1331 Concord Avenue, P.O. Box H20,
California, CA 94524-2099

PROJECT DIRECTOR: Walter J. Bishop, General Manager

Telephone: (925) 688-8117

PROJECT TITLE: Rock Slough Watershed Management Project

APPLICANT ELIGIBILITY:

Local Public Agency not represented by County Government pursuant to Section 3.a.(1)(b). The Contra Costa Water District (CCWD) contacted Contra Costa County (County) to discuss the Rock Slough Watershed Management Project. The County and CCWD agreed that the County would not apply for funds under this program and that CCWD should do so instead and take the lead for the project. A letter from the County is included with this application as Attachment 1.

PROJECT ELIGIBILITY:

The Rock Slough watershed is located in Contra Costa County within the statutory Delta defined in Water Code Sec. 12200. The intake to the Contra Costa Canal (Canal), which is located at the western end of Rock Slough, is the source of drinking water for CCWD. There is a net flow toward the intake when the Canal pumping plants are operating; as such, the Rock Slough watershed, for the purpose of this application, is defined as the area draining into Rock Slough between Old River and the first Canal pumping plant near Highway 4 in Oakley. The entire watershed falls within the Delta Program area described in Section 3.b.(1) of the Request for Proposals (RFP).

The Rock Slough Watershed Management Project is eligible for funding under requirement 3.b.(2)(a) of this program because the primary objective of the project is to reduce contaminants in the CCWD raw water supply. CCWD provides drinking water to a total population of approximately 400,000, partly through its own treatment plants and partly by supplying raw water to the Diablo Water District (serving Oakley), the Southern California Water Company (serving Bay Point) and the cities of Antioch, Pittsburg, and Martinez.

This project will involve voluntary participation of property owners in the Rock Slough watershed. We have received verbal approval and have requested letters of support for the project.

FISCAL SUMMARY:

Total Delta Program Funds Requested \$ 200,000

The Budget Summary Sheet (page 3) provides a breakdown of costs into the categories required by the State Water Resources Control Board (SWRCB). This cost is for (1) water quality monitoring to pinpoint the sources and magnitudes of contaminant loading and (2) consultant assistance in preparing a feasibility study to identify and quantify the costs and benefits of mitigation alternatives. Administrative costs and personnel costs from CCWD will not be charged to the project.

SUMMARY PROJECT DESCRIPTION:

Background

The Rock Slough intake to the Contra Costa Canal is located in the west-central Delta in the vicinity of Knightsen in eastern Contra Costa County. The land surrounding Rock Slough is primarily agricultural. Peaks in Rock Slough salinity are typically caused by seawater intrusion from the San Francisco Bay during periods of low Delta outflow, or by agricultural drainage discharges from the Delta and San Joaquin River. Agricultural drainage during wet winters can lead to significant increases in the concentrations of dissolved solids, total organic carbon (TOC), and possibly pathogens, in CCWD's drinking water supply from Rock Slough and at other urban drinking water intakes in the Delta.

Additional Monitoring

To pinpoint and quantify the sources of salt and other contaminants into Rock Slough and the Canal, simultaneous measurements along a number of locations (up to twelve) between Pumping Plant No. 1 and the junction with Old River are planned for the late fall/winter of 1998-99. The first set of measurements will obtain EC and other water quality parameters at 1-hour intervals over a one week period. Subsequent sampling will focus on the locations where significant water quality degradation is observed.

Feasibility Study

The major portion of the requested funding will be used for consultant services to analyze the feasibility of various options to reduce the impacts of agricultural drainage on CCWD's water supply. The alternatives would be screened for potential water quality improvements and environmental, economic, and other impacts. Alternatives may include, but are not limited to: (1) relocation, (2) changing timing of discharge, (3) treatment, and (4) isolation of intake to Contra Costa Canal from drainage source.

BUDGET SUMMARY SHEET**STATE WATER RESOURCES CONTROL BOARD
DELTA TRIBUTARY WATERSHED PROGRAM****AGENCY:** Contra Costa Water District

	Total funds requested \$
A. Personnel Services	
B. Operating Expenses	20,000
C. Property Aquisitions	
- Equipment	
- Furniture	
- Portable assets	
- Electronic data, processing equip.	
- Miscellaneous, other	
D. Professional and Consulting Services	180,000
E. Construction Expenses	
F. Administration	
TOTAL BUDGET	200,000

Notes:

Operating expenses are for rental of water quality monitoring equipment.

Professional and Consulting Services are for the feasibility study.

PROJECT APPLICATION

1. **Project Name:** Rock Slough Watershed Management Project
2. **Lead Agency:** Contra Costa Water District
Address: 1331 Concord Avenue
P.O. Box H2O
Concord, CA 94524-2099
Project Director: Walter J. Bishop **Phone:** (925) 688-8117

3. Project Description:

Background

High salinity at CCWD's Delta intakes is due to sea water and/or agricultural drainage. Whereas high salinity caused by sea water intrusion can be reduced only by costly measures such as increasing Delta outflow or major changes in Delta channels, salinity impacts due to agricultural drainage can be mitigated to a significant extent by pretreatment or by relocating those discharges that have the greatest impacts on CCWD.

Salinity due to agricultural drainage can be distinguished from that due to sea water by the different relationship between its electrical conductivity (EC) and chloride (or the concentrations of other dissolved solids). Agricultural drainage at interior Delta stations such as Rock Slough can also be identified when the salinity at an interior station is higher than that at more seaward stations (e.g. at Jersey Point).

The major sources of agricultural drainage reaching CCWD's intakes are farmlands on Delta islands and in the watershed of San Joaquin River. The salinity of these drainage varies considerably, both seasonally and geographically. Typically, discharges from Delta islands have the highest salinity when the fields are leached in winter months. Salinity in the San Joaquin River decreases as the flow increases.

Most of the agricultural drainage discharges are well mixed in the channel water by the time they reach CCWD's intakes, and only a small fraction of the agricultural drainage from distant sources is actually diverted at CCWD's intakes. Results from numerical simulations suggest that distant sources of agricultural drainage constitute a few percent in CCWD's water supply. However, a number of discharges in the immediate vicinity of CCWD's Rock Slough intake have a major influence on the quality of CCWD's water supply, leading to significant increases in salinity and other contaminants. Mitigation of these sources could lead to substantial improvements in CCWD's water quality.

The following description of the water quality impacts of agricultural drainage on CCWD's drinking water supply provides the basis for the Rock Slough Watershed Management Project (RSWMP) which is described below.

Drainage Impact

The Rock Slough intake to the Canal is located in the west-central Delta in the vicinity of Knightsen in eastern Contra Costa County. The land surrounding Rock Slough is primarily agricultural. Water levels in Rock Slough are subject to tidal variations, and a typical daily variation is about 3.5 feet. Rock Slough salinity is high when there is seawater intrusion from San Pablo Bay during periods of low Delta outflow, or when agricultural drainage discharges from the Delta and the San Joaquin River are high (in both volume and salinity, typically during leaching in wet periods when Delta outflow is high). Seawater intrusion typically occurs during the summer months in dry years and fall months in most years. Local drainage has historically increased the salinity at the intake by up to 130 mg/L chloride, close to the 150 mg/L chloride objective in the May 1995 Water Quality Control Plan for the Bay-Delta. The main impact of agricultural drainage is to increase dissolved solids, TOC, and possibly pathogens at the intake.

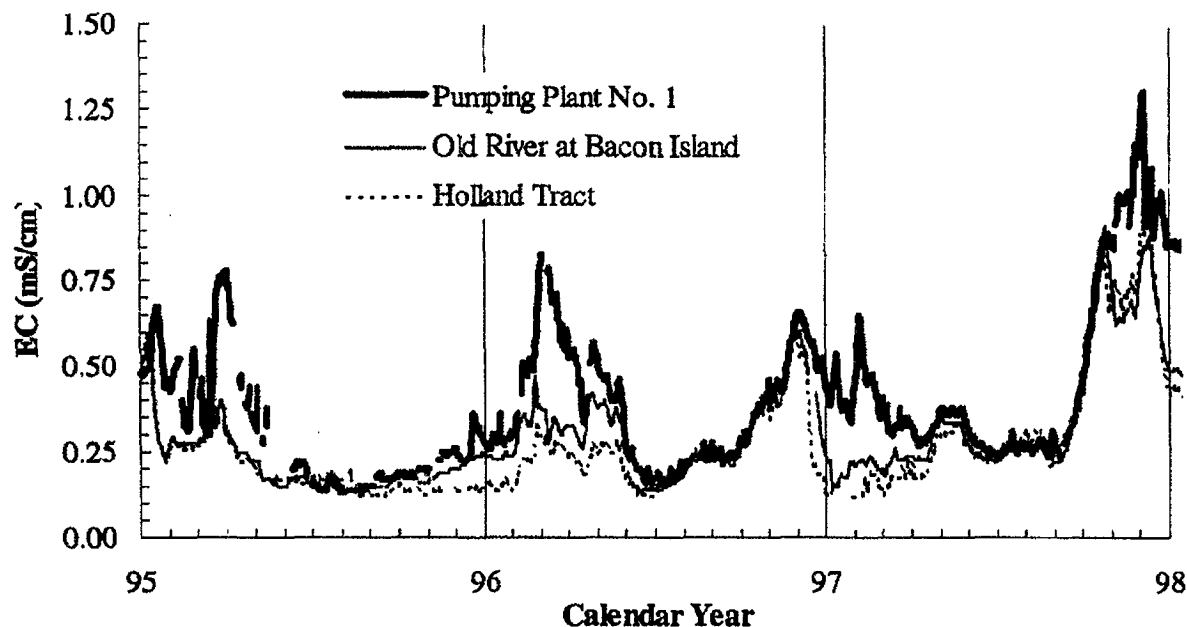
Dispersion of the discharge is dominated by two processes governing the flow in Rock Slough and the Canal. Tidal effects induce an oscillatory flow which carries a portion of the Veale Tract discharge into Indian Slough and Sandmound Slough. At the same time, CCWD's diversion induces a mean flow in Rock Slough towards the Contra Costa Canal and carries the rest of the Veale Tract discharge to CCWD's intake. At times of high CCWD diversion, a major portion of the Veale Tract drainage is drawn into the Canal. However, this drainage is diluted by the time it reaches Pumping Plant No.1 at the Canal.

Two measurements of the water quality of the drainage from Veale Tract are available. The total dissolved solids concentration was 2,160 mg/L in a December 1981 grab sample and 3,560 mg/L in a January 1982 sample. The January 1982 measurement also showed a chloride concentration of 1,014 mg/L and sodium concentration of 770 mg/L. The volume of drainage is not known, but even a limited discharge (e.g. 5 million-gallons-per-day) can lead to a substantial increase in chloride in CCWD's water supply.

A number of rapid and sharp increases in chloride at Pumping Plant No.1 at times of relatively good water quality in the Delta have been attributed to agricultural drainage into Rock Slough. For example, chloride concentration at Pumping Plant No. 1 increased from 57 mg/L on January 12, 1981 to 105 mg/L on January 15 when that in Old River at Holland Tract remained in the 30's. Simultaneous measurements on January 20, 1982 showed that the chloride concentration increased from 27 mg/L in Old River at Holland Tract to 91 mg/L in Rock Slough near the Sandmound Slough junction, to 131 mg/L at Pumping Plant No.1.

More recent measurements are shown in Figure 1 for the calendar years 1995-97. Mean daily electrical conductivity (EC) at Pumping Plant No. 1 is compared to those at Old River at Bacon Island (near Santa Fe Railway Cut) and Holland Tract (near the junction of Sand Mound Slough and Piper Slough). The two latter stations give an estimate of the salinity in Rock Slough at Old River. In all four years of record, EC at Pumping Plant No.1 was higher than that in Old River in the winter months. The periods of maximum salinity difference correlated with periods of high precipitation, when the farmlands in the Delta are usually leached and discharge high salinity return flows into Delta channels.

Figure 1. Salinity increase along Rock Slough and Contra Costa Canal



Note: Rock Slough pumping is small in November and December of 1997.

Water quality data on the Veale Tract drainage suggest that the discharge can increase chloride concentration at the intake by tens of mg/L. For example, if 5 MGD (7.7 cfs) was being discharged from Veale Tract with a chloride concentration of 750 mg/L and most of the discharge reached the intake, and if CCWD was diverting at 100 MGD (155 cfs) from Rock Slough which had a salinity of 50 mg/L chloride, the chlorides in Rock Slough would increase to 85 mg/L, an increase of 35 mg/L. The actual drainage from Veale Tract could be much higher.

Rock Slough Watershed Management Project

Task 1: Additional Monitoring

To identify and quantify the sources of salt load into Rock Slough and the Canal, simultaneous measurements along a number of locations (up to twelve) between Pumping Plant No. 1 and the junction with Old River are planned for the late fall/winter of 1998-99. The first set of measurements would obtain EC and possibly other water quality parameters at 15-minute intervals over one week. Based on these results, additional sampling will be performed. The additional sampling will probably be limited to grab samples to test for contaminants and their sources.

Recent monitoring by CCWD indicates that additional monitoring will yield interpretable results and provide essential information for the feasibility study.

Task 2: Feasibility Study

Based on the findings of the monitoring program, CCWD proposes to conduct a feasibility study to develop and evaluate options to reduce the impacts of agricultural discharge. The purpose of the feasibility study is to define a comprehensive list of alternatives from which a preferred solution can be chosen. The types of alternatives will include but not be limited to the following:

a) Relocation

The discharge from Veale Tract into Rock Slough could be relocated to several places, such as Sand Mound Slough north of the one-way gates, No Name Cut (actual name) at the southern end of Veale Tract, or Marsh Creek below the discharge location of the Brentwood wastewater treatment plant. Issues to be considered include impacts on agricultural and other beneficial uses adjacent to Rock Slough, including Holland Tract and Hotchkiss Tract.

b) Changing Timing of Discharges

Modification of discharge configuration and/or timing the discharge of the drainage from Veale Tract could reduce the impacts to drinking water quality. This could be achieved, e.g., by storing drainage water on Veale Tract and only discharging during the ebb tide (from west to east). Issues to be considered include the need for storage and CCWD's pumping, which usually causes the flow in this stretch of Rock Slough to not reverse on the ebb tide.

c) Treatment

Drainage from Veale Tract could be collected and conveyed to an urban wastewater treatment facility. The nearest treatment plants are the Brentwood Wastewater Treatment Plant and the Ironhouse Sanitary District facility in Oakley. The drainage could also be discharged into existing or created wetlands areas, which would remove some constituents before the water is discharged into Delta channels. Issues to be addressed include the high cost of treatment and the availability of land for constructed wetlands.

d) Isolation of Intake to Contra Costa Canal from Drainage Source

One potential project is a one-way flow barrier (west to east only) to be constructed at the Delta Road Bridge which could cause water to be drawn into Rock Slough from Sandmound Slough, i.e., in the reverse direction of the existing tidal flap gate. Issues to be addressed include impacts on navigation, recreation, and other beneficial uses.

Task 3: Stakeholder Involvement

A Watershed Stakeholder Group will be formed consisting of local property owners and others interested in the watershed. CCWD will host workshops to provide technical information on the project and a forum for group members to discuss the options investigated in the feasibility study.

CCWD has successfully included stakeholder involvement in several significant projects, including the Los Vaqueros Project, the Future Water Supply Study, the Los Vaqueros Recreation Program, and the Facility Reserve Charge development.

4. Cooperating Agencies:

CCWD is in contact with various agencies about this project. However, there are no formal agreements at this time.

5. Map

A map of the project area is included with this application as Attachment 2.

6. Phased Project

This project is a phased project. The first phase, the water quality monitoring program designed to determine the sources of contaminants in Rock Slough, has been started by CCWD. The second phase consists of a feasibility study for various alternative mitigation measures.

7. Schedule

4/99 - Complete Phase 1 Monitoring
5/99 - Complete RFP for Consultant Services
12/99 - Complete Feasibility Study

8. Other Resource Management Plans

There are no existing other resource management plans in the area. Previous studies include the East Knightsen Drainage Study of 1985, CCWD's Sanitary Survey for the Canal (1997) and CCWD's Canal Drainage Study (1998).

9. Actions Accomplished to Date

Monitoring of water quality has been performed by CCWD, DWR, and the Bureau over many years. Intensive monitoring of Rock Slough was carried out on various occasions in 1998. Other existing water quality data have been collected, processed, and analyzed.

10. Educational Element

A Watershed Stakeholder Group will be formed consisting of local property owners and others interested in the watershed to address drainage and flooding issues. One of the purposes for the Watershed Stakeholder Group to be formed is to educate property owners about the project. The formation and work of the Watershed Stakeholders Group will be according to the "Principles of Watershed Community Involvement".

11. Volunteer Monitoring Element

Although not planned as part of the project, voluntary monitoring may result from the initiative of the Watershed Stakeholder Group.

12. NPDES Permit Requirements

An NPDES permit is not required for this project and this project is not conducted to fulfill the requirements of an NPDES permit.

13. Milestones

The following milestones have been identified for this project

- Completion of Monitoring (ongoing)
- Formation of Watershed Stakeholder Group
- Completion of Feasibility Study

14. Commitments to Complete Project

CCWD has existing placeholders in its 10-year Capital Improvement Plan (CIP) for projects which may be recommended by the consultant conducting the feasibility study. The feasibility study is scheduled for completion in December of 1999 in order to allow identified projects to be included in the updated CIP and the FY01/02 budget. Federal and state funding (as provided for in the Clean Water Act and the Safe Drinking Water Act) will also be sought for part of the funding for the implementation phase.

Rock Slough is a major source of drinking water for approximately 400,000 people. Old River was recently developed as an alternative source as part of the Los Vaqueros project. Old River does not replace Rock Slough. The use of Old River instead of Rock Slough actually intensifies the impact of drainage from the Rock Slough watershed because, in the absence of pumping, tidal flushing is very inefficient in diluting drainage inflow or carrying it out into the Bay.

CCWD and other drinking water agencies will be faced with meeting even more stringent drinking water standards in the near future. The quality of the supply must be improved to meet those standards. Watershed management has the potential to improve water quality at a

substantially lower cost than developing new supplies or adding advanced treatment. CCWD is committed to this project for the long-term.

15. Anticipated Future Work and Commitments

It is anticipated that this project will identify projects that will improve water quality in Rock Slough. The implementation of these project will be the responsibility of CCWD. CCWD has committed substantial resources to this effort and will continue to seek supplementary funding from other sources.

Attachment 1: Letter from County

Attachment 2: Project Map